multiple surfaces of the test object and the at least one reference surface defining a set of cavity surfaces;

recording an interference signal at different locations of the optical interference image in response to tuning the frequency of the optical wave front over a range of frequencies, wherein the interference signal includes a contribution from each pair of different surfaces in the set of cavity surfaces;

transforming the interference signal into the frequency domain for at least one of the locations to produce a transformed signal having a series of frequency peaks corresponding to the pairs of different surfaces in the set of cavity surfaces;

identifying a frequency corresponding to each of one or more selected pairs of surfaces from the series of frequency peaks; and

determining an absolute optical thickness for each of the selected pairs of surfaces based on the corresponding identified frequency and the frequency tuning rate.

Add new claims 41-48:

--41. (New) An interferometry method comprising:

forming an optical interference image by combining different portions of an optical wave front reflected from multiple surfaces;

recording an interference signal at different locations of the optical interference image in response to varying the frequency of the optical wave front over a range of frequencies;

transforming the interference signal for at least one of the locations to produce a spectrum having a peak corresponding to each pair of the multiple surfaces;

identifying a peak in the spectrum corresponding to a selected pair of the multiple surfaces; and

for each location, transforming the interference signal with respect to the identified peak to produce a transformed signal corresponding to the selected pair of surfaces.--

--42. (New) The interferometry method of claim 41, further comprising, for each of the different locations, extracting the phase of the transformed signal and determining variations in

an optical path distance between the selected pair of surfaces based on variations in the extracted phase for the multiple locations of the optical interference image.--

--43. (New) The interferometry method of claim 41, wherein the multiple surfaces include at least one reference surface and at least one surface of a test object.--

--44. (New) The interferometry method of claim 41, further comprising:

identifying a second peak in the spectrum corresponding to a second selected pair of the multiple surfaces; and

for each location, transforming the interference signal with respect to the second identified peak to produce a second transformed signal corresponding to the second selected pair of surfaces.--

cont. a4

--45. (New) An interferometry system comprising:

a frequency-tunable light source;

an interferometer which during operation directs different portions of an optical wave front derived from the light source to multiple surfaces and recombines the different portions to form an optical interference image;

a multi-element photo-detector positioned to record an interference signal at different locations of the optical interference image in response to frequency tuning of the light source; and

an electronic controller coupled to the light source and the photo-detector, wherein during operation the controller: transforms the interference signal for at least one of the locations to produce a spectrum having a peak corresponding to each pair of the multiple surfaces; identifies a peak in the spectrum corresponding to a selected pair of the multiple surfaces; and for each location, transforms the interference signal with respect to the identified peak to produce a transformed signal corresponding to the selected pair of surfaces.--

--46. (New) The interferometry system of claim 45, wherein during operation the electronic controller further, for each of the different locations, extracts the phase of the

transformed signal and determines variations in an optical path distance between the selected pair of surfaces based on variations in the extracted phase for the multiple locations of the optical interference image.--

--47. (New) The interferometry system of claim 45, wherein the multiple surfaces include at least one reference surface in the interferometer and at least one surface of a test object.--

Cont'd
Cl 4

--48. (New) The interferometry system 45, wherein during operation the electronic controller further identifies a second peak in the spectrum corresponding to a second selected pair of the multiple surfaces, and, for each location, transforms the interference signal with respect to the second identified peak to produce a second transformed signal corresponding to the second selected pair of surfaces.--